

## CLAIMS

I claim:

1. A method of co-allocating resources within a compute environment, the method comprising:
  - receiving a first request for a reservation for a first type of resource;
  - analyzing constraints and guarantees associated with the first request;
  - identifying a first group of resources that meet the first request;
  - receiving a second request for a reservation for a second type of resource;
  - analyzing constraints and guarantees associated with the second request;
  - identifying a second group of resources that meet the second request; and
  - generating a co-allocation map between the first group of resources and the second group of resources.
2. The method of claim 1, further comprising reserving resources according to the generated co-allocation map.
3. The method of claim 1, wherein generating the co-allocation map comprises identifying a reduced map of quantities of resources that can simultaneously satisfy the first request and the second request.
4. The method of claim 3, wherein the co-allocation map comprises all time frames where available resources exist that satisfy the first request and the second request.
5. The method of claim 1, wherein possible types of resources comprise at least one of: compute resources, disk storage resources, network bandwidth resources, memory resources, licensing resources.
6. The method of claim 1, wherein generating the co-allocation map further comprises identifying an intersection of the availability of each of the first type of resource and the second type of resource.
7. The method of claim 6, wherein generating the co-allocation map further comprises determining intersecting time frames in which both the first request and the second request may be simultaneously satisfied.

8. The method of claim 7, further comprising:  
generating a resulting array of events describing the intersecting time frames.
9. The method of claim 8, wherein the resulting array of events comprises at least one of resource quantity, resource quality, time frames, quality of information and cost.
10. The method of claim 1, wherein the first request and the second request comprise at least one of: a job description, at least one time frame availability, a description of minimum resources, a description of resource types and attributes, a reservation duration minimum.
11. The method of claim 1, wherein identifying the first group of resources and the second group of resources further comprises analyzing events associated with the first request and the second request and how resource availability changes over time.
12. The method of claim 11, wherein the events comprise at least one of job start, job completion, state change, boundaries, reservations and policy enforcement limits.
13. The method of claim 1, further comprising reporting at least one of the following parameters associated with the identified first and second group of resources: cost, quality of information data, resource quantity data, time frame data, and resource quality data.
14. The method of claim 1, further comprising:  
performing again, under constraints identified by the co-allocation map, the step of identifying a first group of resources that meet the request for the first type of resource.
15. The method of claim 14, further comprising:  
performing again, under constraints identified by the co-allocation map, the step of identifying a second group of resources that meet the request for the second type of resource.
16. The method of claim 1, wherein:  
receiving a request for a reservation for a first type of resource further comprises receiving a request for the first type of resource for a first time frame, and wherein the identifying and analyzing steps for the first type of resource take into account the first time frame;

receiving a request for a reservation for a second type of resource further comprises receiving a request for the second type of resource for a second time frame, wherein the identifying and analyzing steps for the second type of resource take into account the second time frame; and generating the co-allocation map between the first group of resources and the second group of resources further comprises calculating an intersection of the first time frame and the second time frame.

17. The method of claim 1, wherein the constraints are at least one of resource matching in terms of type, attribute or quantity.

18. The method of claim 1, wherein the constraints and guarantees associated with the first request and the second request relate to resource-based policies.

19. The method of claim 1, wherein the constraints and guarantees associated with the first request and the second request relate to time-based policies.

20. The method of claim 19, wherein the time-based policies limit requestors to a pre-determined quantity of resources at any given moment in time.

21. The method of claim 1, wherein receiving a request for a reservation for a first type of resource further comprises receiving a request for a reservation for the first type of resource having an attribute.

22. The method of claim 21, wherein the attribute is at least one of disk storage space, memory, license scope, network bandwidth capability, clock speed and central processing power.

23. The method of claim 1, wherein the co-allocation map is computed as one of an intersection, a union or a distinct response.

24. The method of claim 23, further comprising, before reserving compute resources, presenting to a requestor of a reservation of the first and second type of resources an analysis of the compute resources and a possible reservation.

25. The method of claim 24, wherein the presented analysis relates to a quantity and quality of the compute resources in relation to the request for a reservation for resources.

26. The method of claim 25, further comprising:  
receiving from the requestor of a reservation a revised request for resources based on the presented analysis.

27. The method of claim 23, wherein a requestor may select that generating the co-allocation map returns an analysis according to at least one of the interaction, union or distinct response.
28. The method of claim 27, wherein the analysis returned to the requestor, according to at least one of the interaction, union or distinct response, corresponds to an analysis of the quantity of resources and a degree of fulfillment of the request according to available resources.
29. The method of claim 28, wherein the analysis returned to the requestor further comprises a list of resources that can fulfill the request of the requestor.
30. The method of claim 28, wherein the analysis returned to the requestor further comprises a transaction ID associated with the analysis.
31. The method of claim 30, further comprising presenting to the requestor an option to submit the request with reference to the transaction ID.
32. A method of claim 1, wherein the generated co-allocation map represents a set of resources exclusive to at least one of the first request or the second request.
33. The method of claim 32, wherein the first request specifies exclusivity.
34. The method of claim 33, further comprising:  
guaranteeing that the first request will be able to reserve exclusive resources.
35. The method of claim 32, further comprising generating a co-allocation map between the first group of resources and the second group of resources.
36. A system for co-allocating resources within a compute environment, the system comprising:  
means for receiving a first request for a reservation for a first type of resource;  
means for analyzing constraints and guarantees associated with the first request;  
means for identifying a first group of resources that meet the request for the first type of resource;  
means for receiving a second request for a reservation for a second type of resource;  
means for analyzing constraints and guarantees associated with the second request;  
means for identifying a second group of resources that meet the request for the second type of resource; and  
means for generating a co-allocation map between the first group of resources and the second group of resources.

37. The system of claim 36, further comprising means for reserving resources according to the calculated co-allocation map.
38. A system for co-allocating resources within a compute environment, the system comprising:  
a module configured to receive a first request for a reservation for a first type of resource;  
a module configured to analyze constraints and guarantees associated with the first request;  
a module configured to identify a first group of resources that meet the request for the first type of resource;  
a module configured to receive a second request for a reservation for a second type of resource;  
a module configured to analyze constraints and guarantees associated with the second request;  
a module configured to identify a second group of resources that meet the request for the second type of resource; and  
a module configured to generate a co-allocation map between the first group of resources and the second group of resources.
39. The system of claim 38, further comprising a module configured to reserve resources according to the calculated co-allocation map.
40. A compute-readable medium storing instructions for controlling a computing device to co-allocate resources within a compute environment, the instructions comprising:  
receiving a first request for a reservation for a first type of resource;  
analyzing constraints and guarantees associated with the first request;  
identifying a first group of resources that meet the request for the first type of resource;  
receiving a second request for a reservation for a second type of resource;  
analyzing constraints and guarantees associated with the second request;  
identifying a second group of resources that meet the request for the second type of resource; and  
generating a co-allocation map between the first group of resources and the second group of resources.
41. The computer-readable medium of claim 40, wherein the instructions further comprise reserving resources according to the calculated co-allocation map.

42. A method of co-allocating resources within a compute environment, the method comprising:

- receiving a first request for a reservation for a first type of resource;
- analyzing constraints and guarantees associated with the first request;
- identifying a first group of resources that meet the request for the first type of resource;
- receiving a second request for a reservation for a second type of resource;
- analyzing constraints and guarantees associated with the second request;
- identifying a second group of resources that meet the request for the second type of

resource; and

- generating a set of resources exclusive to at least one of the first request or the second request.

43. The method of claim 42, wherein the first request may specify exclusivity.

44. The method of claim 43, wherein if exclusivity is requested, the method comprises guaranteeing that the first request will be able to reserve exclusive resources.

45. The method of claim 44, further comprising generating a co-allocation map between the first group of resources and the second group of resources.